

## A Photon Counting Imaging Detector for NASA Exoplanet Missions

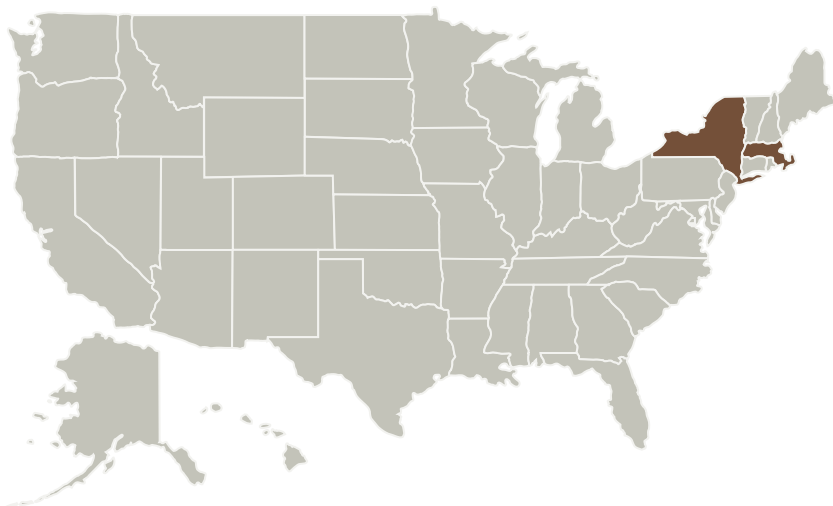
Completed Technology Project (2015 - 2018)



## Project Introduction

The key objective of the proposed project is to advance the maturity of a 256×256 pixel single-photon optical imaging detector. The detector has zero read noise and is resilient against the harsh effects of radiation in space. It will remove the transient effects of particle radiation from the science signal in real time and survive long-term exposure to high levels of radiation without deleterious effects on mission science return. We expect that the device will have state-of-the-art performance in other parameters, e.g., high quantum efficiency from UV to 1  $\mu$ m, low dark current, etc. We will extend proven techniques pioneered at Lincoln Laboratory to design and fabricate Geiger-Mode avalanche photodiode (GM-APD) array detectors based closely on devices recently made by the proposing team. Key innovations in the fabrication process make the devices easier to manufacture as compared to processes used in the past, and they produce an integrated focal-plane structure that is much more thermally and mechanically robust than previous generations of arrays. Once designed and fabricated, we will test the performance of the device in relevant environments that mimic operation in NASA space missions. At the conclusion of all activities, we will report to NASA on the suitability of this detector technology for NASA space missions. This detector will significantly extend NASA science capabilities for exoplanet, astrophysics, planetary, and earth sensing applications. It directly satisfies some of the highest priority technology development recommendations in recent NASA technology assessments.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Science Mission Directorate (SMD)

**Responsible Program:**

Astrophysics Research and Analysis

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Organizations Performing Work	Role	Type	Location
Rochester Institute of Technology(RIT)	Supporting Organization	Academia	Rochester, New York

Primary U.S. Work Locations	
Massachusetts	New York

## Project Management

**Program Director:**

Michael A Garcia

**Program Manager:**

Dominic J Benford

**Principal Investigator:**

Donald F Figer

**Co-Investigators:**

David Harrison

Brian F Aull

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.1 Detectors and Focal Planes

## Target Destination

Outside the Solar System